

## SOAP APPARATUS WITH EMBEDDED SCRUBBING ELEMENT

### TECHNICAL FIELD

The present invention relates generally to implements used to clean  
5 undesired foreign matter from a variety of surfaces, and in particular to a soap apparatus  
having an embedded scrubbing element.

### BACKGROUND OF THE INVENTION

Soap products in the form of a bar have long been in use for a variety of  
10 cleansing purposes. The soap product may be comprised of a variety of specific  
compositions, but is usually formed by saponifying a fatty acid with a base, which generally  
includes a metal hydroxide or a carbonate, to yield a surface-active material that is basic.  
When the soap product is used with water in the conventional manner, the resulting mixture  
is particularly effective in dissolving oils and greases. The resulting mixture is generally  
15 slippery, however, which inhibits the ability of the user to transfer the soap to the surface to  
be cleaned, and may also inhibit the ability of the user to dislodge foreign material from the  
object to be cleansed.

Accordingly, a wide variety of implements are often used in conjunction  
with the soap product in order to enhance the cleansing effect of the soap product. For  
20 example, a cloth, a sponge or even a brush are commonly used to transfer the soap solution  
to a surface to be cleansed. The foregoing implements also mechanically dislodge foreign  
matter from the surface while the surfactant properties of the soap. As a result, effective  
cleansing in many circumstances is obtained only when the foregoing implements are  
available.

25 In order to provide a soap product that combines the surfactant capabilities  
of a soap with a mechanical abrasive capability, various known products also include  
abrasive particles such as pumice, or other similar abrasive materials in order to enhance  
the ability of the soap product to dislodge foreign matter. Although these products possess  
an enhanced ability to remove foreign matter, they do not have the ability to remove foreign

matter in small recesses, such as crevices. For example, when soap products having an abrasive component are used for washing hands, such products are particularly ineffective in removing foreign matter from beneath fingernails.

Other prior art products employ an embedded structure in a soap product.

5 For example, U.S. Patent No. to Ruff discloses a scrubbing soap bar having a length of a thin, fine mesh netting embedded in the soap bar. Since the mesh netting is "wadded" when the bar is formed, the netting may assume a number of various shapes and configurations within the bar. As a consequence, a product having uniformly consistent cleansing properties is generally not obtainable. U.S. Patent No. 6,171,007 B1 to Hsu  
10 discloses a net embedded in a cake of a soap material. The disclosed net is comprised of a perforated sheet of material that is formed into an envelope, which is then cast into a soap bar. Although the disclosed net avoids the particular shortcoming present in the foregoing device, the ability of a perforated sheet to remove foreign matter by mechanical action is limited. U.S. Patent No. 4,050,825 to Stein discloses a soap bar having a brush element  
15 integrally formed in the bar. Although the brush is capable of cleansing a surface with greater effectiveness, the integral brush contributes significantly to the overall cost of the soap bar.

Accordingly, there is a need in the art for a soap product having an embedded scrubbing device that offers enhanced cleansing capabilities that is relatively  
20 inexpensive to manufacture.

## SUMMARY OF THE INVENTION

The present invention relates generally to an apparatus used to clean undesired foreign matter from a variety of surfaces, and in particular to a soap apparatus  
25 having an embedded scrubbing element. In one aspect of the invention, a scrubbing soap bar includes a scrubbing element having a filamentous network with internal void regions and a soap material that substantially surrounds the scrubbing element and at least partially fills the void regions within the scrubbing element. In another aspect of the invention, a method of manufacturing a soap bar having a scrubbing element includes forming a

scrubbing element from a non-woven and porous material, and infiltrating the non-woven and porous material with a soap material to form the soap bar. In still another aspect, a method of manufacturing a soap bar having a scrubbing element includes positioning a scrubbing element in a mold configured to receive the scrubbing element, adding a soap  
5 material to the mold to form a solid bar that encapsulates the scrubbing element, and removing the solid bar from the mold.

#### BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is an isometric view of a soap bar having an embedded scrubbing  
10 element according to an embodiment of the invention.

Figure 2 is an isometric view of the embedded element for the embodiment shown in Figure 1.

Figure 3 is a cross sectional view of a step in a method for manufacturing a soap bar according to another embodiment of the invention.

15 Figure 4 is a cross sectional view of another step in a method for manufacturing a soap bar according to another embodiment of the invention.

Figure 5 is a cross sectional view of a still another step in a method for manufacturing a soap bar according to another embodiment of the invention.

#### 20 DETAILED DESCRIPTION OF THE INVENTION

The present invention is generally directed to implements used to clean undesired foreign matter from a variety of surfaces, and in particular to a soap bar having an embedded scrubbing element. Many of the specific details of certain embodiments of the invention are set forth in the following description and in Figures 1 to 4 to provide a  
25 thorough understanding of such embodiments. One skilled in the art will understand, however, that the present invention may be practiced without several of the details described in the following description. Moreover, in the description that follows, it is understood that the figures related to the various embodiments are not to be interpreted as conveying any specific or relative physical dimension. Instead, it is understood that

specific or relative dimensions related to the embodiments, if stated, are not to be considered limiting unless the claims expressly state otherwise.

Figure 1 is an isometric view of a soap bar 10 according to an embodiment of the invention. The soap bar 10 includes a solid soap material 12 that encases a scrubbing element 14. The soap material 12 may include well-known materials formed by the saponification of organic fat stocks with an alkali, and may include other synthetic surfactants, such as fatty alcohol ether sulfates or fatty acid isethionates. Alternately, the soap material 12 may be comprised of various known synthetic detergent materials. In either case, the soap material 12 may also include additional additives, such as lanolin, lecithin, various vegetable oils, vitamins including vitamin E, partial glycerides and other fat-like substances that are effective in moisturizing cleansed skin, various antioxidants such as ascorbyl palitate or tocopherol for preventing rancidity in the soap material 12, as well as various dyes and perfumes to impart a desired color and scent.

Referring still to Figure 1 and also now to Figure 2, the scrubbing element 14 is a generally filamentous mass of synthetic or organic fibers 16 that is formed in a cubical or rectangular cross-sectional shape to generally conform to the conventional shape of a soap bar, although other shapes, including ellipsoids, oblate ellipsoids and even spherical shapes may be used. In a particular embodiment, the scrubbing element 14 is comprised of a durable, three-dimensional, non-woven nylon filament network generally known as SCOTCH BRITE, available from the Minnesota Mining and Manufacturing Co. (3M) of St. Paul, Minnesota, although other similar materials may also be used. In other aspects, the scrubbing element 14 may be comprised of various natural filamentous materials such as wool, cotton or other similar fine, fibrous substances, or even the fibrous portion of various vascular plants, such as the well-known tropical dishcloth gourd of the Curcubitaceae family. The scrubbing element 14 may also be comprised of still other materials. For example, natural or synthetic sponges may be used. Additionally, fibrous metallic materials, known generally as "steel wool", and other similar materials may also be used.

Still referring to Figures 1 and 2, the scrubbing element 14 is positioned within the soap material 12 so that the scrubbing element 14 substantially extends throughout a volume of the soap bar 10. Further, the scrubbing element 14 is encased within the soap material 12 so that the soap material 12 also substantially occupies and fills  
5 void portions present in the scrubbing element 14.

Figure 3 is a cross-sectional view illustrating a step in a method 20 of manufacturing the soap bar 10 of Figure 1. The scrubbing element 14 is positioned in a mold 16 that is suitably sized to receive the scrubbing element 14. The mold 16 may additionally include one or more ribs 18 integrally formed on a lower surface 17 of the  
10 mold 16 to position the scrubbing element 14 away from the lower surface 17 so that the soap material 12 may substantially surround the soap bar 10 during the formation process, as will be described in further detail below. The mold 16 may also include a removable cover 17 that permits the scrubbing element 14 to be enclosed in a hermetically sealed enclosure when the cover 17 is fixedly attached. The cover 17 also includes one or more  
15 ports 21 that extend through the cover 17 to permit air to be withdrawn from the enclosure, and further to permit the soap material 12 to be supplied to the mold 16.

Figure 4 is a cross-sectional view illustrating another step in a method 20 of manufacturing the soap bar 10 of Figure 1. With the cover 17 of the mold 16 attached, air 23 may be evacuated from the mold 16 through the port 21 prior to supplying the soap  
20 material 12 to the mold. The air 23 may be removed from the mold 16 by a vacuum pump or by other similar means so that the air 23 is at least partially removed from the void portions in the scrubbing element 14. Following the removal of the air 23 from the mold 16, the soap material 12 may be supplied to the mold 16 as a semi-liquid stream 24. Since the air 23 has at least partially been removed from the scrubbing element 14, the soap  
25 material 12 fully permeates the void portions in the scrubbing element 14 during the forming process. After the semi-liquid material 24 sets in the mold, the soap bar 10 is formed.

Figure 5 is a cross-sectional view illustrating a final step in a method 20 of manufacturing the soap bar 10 of Figure 1. After the soap bar 10 is formed in the mold 16

as previously described, the cover 17 (as shown in Figures 3 and 4) is removed, and the soap bar 10 is removed from the mold 16. Although the foregoing method describes forming the soap bar 10 by at least partially evacuating the mold 16 so that air is removed from the scrubbing element 14, it is understood that the soap bar 10 may also be formed by  
5 allowing the soap material 12 to gradually permeate into the scrubbing element 14 without the assistance of a partial vacuum within the mold 16.

The foregoing embodiments of the invention offer significant advantages over the prior art. For example, since the scrubbing element 14 extends throughout the soap bar 10, the scrubbing element 14 it is not detachable from the soap bar 10, particularly  
10 as the soap material 12 gradually dissolves as the soap bar 10 is used. The filamentous structure of the scrubbing element 14 advantageously permits the soap bar 10 to cleanse objects having recesses and crevices with greater effectiveness than other prior art soap bars since the filaments possess the ability to reach into recesses and crevices.

From the foregoing it will be appreciated that, although specific  
15 embodiments of the invention have been described herein for purposes of illustration, various modifications may be made without deviating from the spirit and scope of the invention. For example, certain features shown in the context of one embodiment of the invention may be incorporated into other embodiments as well. Accordingly, the invention is not limited by the foregoing description of embodiments except as by the following  
20 claims.